

(FILE 'USPAT' ENTERED AT 10:49:55 ON 02 MAY 1997)

## SET PAGE SCROLL

L1 4 S MOON, BILLY G./IN  
L2 49 S 395/286/CCLS  
L3 2068 S HALF (P) DUPLEX  
L4 1109 S L3 AND FULL (P) DUPLEX  
L5 38 S L4 AND UART AND (BI-DIRECTIONAL OR TWO WAY)  
L6 1 S L5 AND WIRELESS (P) COMMUNICATION

=> d kwic

US PAT NO: 4,817,089 [IMAGE AVAILABLE]

L6: 1 of 1

## SUMMARY:

BSUM(20)

Features . . . techniques. For example, the combined use of a 14.6 Kbps voice coding technique and 16-level DPSK modulation allows four simultaneous full-duplex conversations to be supported on a single pair of 20 Hz Bw channels that are spaced 25 KHz apart in. . .

DETDESC:

DETD(7)

Communication . . . the subscriber stations 10 is accomplished digitally by filtered multiphase differential phase shift keying (MDPSK) modulation on 25 KHz spaced full duplex channels in the 454 to 460 MHz band, thereby satisfying the requirements of 20 KHz bandwidth such as designated in. . .

DETDESC:

DETD(15)

The . . . be adjusted over other ranges of power. While voice communications through the subscriber station are perceived as being real time full-duplex, the RF system operates at half-duplex by utilizing appropriate time division multiplex timing methods.

DETDESC:

DETD(20)

Digital . . . the four or more time slots in each frequency channel. Each base station VCU 17 can process four or more full-duplex voice connections for both the transmit channel and the receive channel of each channel pair. Connections by the PBX 15. . .

DETDESC:

DETD(23)

The . . . the reverse of the transmit function. Each RFU 21, modem 19, CCU 18, VCU 17 and the PBX 15 are full-duplex in nature.

DETDESC:

DETD(27)

Following . . . that usually it is limited to only one voice channel at a time. The subscriber station essentially operates in the half-duplex mode, transmitting in a portion of the TDMA frame and receiving in a different portion of the TDM frame. With a frame size of 45 msec the half-duplex characteristic of the subscriber station is transparent to the user, who hears continuous voice input from the party at the . . .

DETDESC:

DETD(28)

The half-duplex operation of the subscriber station offers opportunity to make more efficient use of the available subscriber station hardware. The subscriber. . . least as far as voice data handling is concerned. However, the modem 30a is set up to operate in a half-duplex mode so that either the receive or transmit portion of the modem are used, but not at the same time. The primary savings here is that the RFU 31a need only operate in half-duplex mode. This saves power in that the RF power amplifier is active for no more than half the time. Also, the RF transmit antenna 32a can be switched to operate as a second receive antenna during the. . .

DETDESC:

DETD(42)

The system uses 20 KHz BW full duplex channels in the 450 MHz spectral region on 25 KHz centers and accommodates several simultaneous conversations per channel. Each full duplex channel consists of a receive and a transmit frequency separated by 5 MHz. The lower frequency of each channel is. . .

DETDESC:

DETD(51)

The format of the system frame ensures that the modem 19 in the subscriber stations never needs to operate in a full-duplex manner (i.e., transmitting and receiving at the same time). Hence, the slots on the reverse and forward frequencies are offset. . .

DETDESC:

DETD(216)

Every . . . a message or a carriage return character which indicates the end of a message. This module is capable of handling full-duplex message traffic.

DETDESC:

DETD(294)

In . . . companding algorithm to digitize the voice signals into 8-bit samples at an 8 KHz rate. The PCM codec 55 is full-duplex in nature. The digitized voice samples are then fed over line 56 to a "mode select" multiplexer (MUX) 57. The. . .

DETDESC:

DETD(296)

The . . . terminal) via a line 63 using a standard asynchronous RS-232 interface operating up to 9600 baud. The STU includes an UART and timer circuit 64 to synchronize the data from the RS-232 data port 62. The VCU 28 packetizes the synchronized data so that it will pass through the 14.6 Kbps limitation of the channel. Full-duplex data transmission is supported in this mode.

DETDDESC:

DETD(301)

The voice codec unit (VCU) implements four full-duplex RPLP voice compression systems. The VCU design is identical for the base station and the subscriber stations. In the subscriber. . .

DETDDESC:

DETD(302)

The . . . The STU 27 interfaces are a subset of the PBX 15 interfaces in that the STU 27 provides only one full duplex voice channel operation. The timing relationships for the PBX and STU interfaces are identical and are shown in FIG. 15.. . .

DETDDESC:

DETD(351)

FIG. . . . the modem and the CCU hardware. An RS-232C link 123 between the RPU and the CCU is supported by a UART on the microcontroller chip 111. In the subscriber station, the RPU is replaced by the STU, but the interface remains. . .

DETDDESC:

DETD(357)

The CCU and RPU communicate via link 123 through a full duplex RS-232C interface, called the baseband control channel (BCC). Asynchronous characters are eight-bit binary and are transmitted at 9600 baud. One. . .

DETDDESC:

DETD(364)

The CCU handles full duplex data flow via the transmit and receive buses 107, 108. During a given slot time, transmit voice data originating at. . .

DETDDESC:

DETD(455)

The BCC receive module is implemented via the on-chip RS 232 UART. The UART is capable of generating one internal interrupt, which is triggered whenever a byte is received or transmitted. The BCC handler. . .

DETDESC:

DETD(475)

The modem operates in one of three operation modes. In the base station, the modem carries on a full-duplex transmit and receive function. When operating in the subscriber station, the modem operates in a half-duplex mode, transmitting during part of the TDMA frame and receiving during another part of the TDMA frame. The third mode. . .

DETDESC:

DETD(497)

The base station modem operation is assigned to a fixed RF frequency. Communication at the base station is full duplex, therefore the modem receiver and transmitter will be operating simultaneously. A modem also is assigned to be the control frequency. . .

DETDESC:

DETD(501)

Communication is half-duplex at the subscriber station. Thus, when the transmitter is idle, it is inhibited. The modem 30a, when not actively transmitting,. . .

DETDESC:

DETD(524)

The subscriber station RFU functions as a half-duplex transceiver with the receivers inactive during the transmit intervals. The transmit burst rate is sufficiently high to simulate full-duplex operation to the user. The frequency channel assigned is that selected by the base station RPU.

DETDESC:

DETD(535)

The base station RFUs and antenna interface circuits operate on a full duplex basis. All transmitters and receivers normally operate at 100 percent duty cycle. In addition, it is economically attractive for the. . .

CLAIMS:

CLMS(1)

We claim:

1. A digital wireless system comprising a base station in communication with telephone lines and a plurality of subscriber stations for the simultaneous transmission of information signals over radio frequency (RF).

in the transmit bit stream;  
transmitter and receiver means both at said base stations and at said subscriber for providing direct communication between said base stations and said subscriber stations over the said radio frequency (RF) channels;  
and

each subscriber station operating in a half-duplex mode within a time division multiple access frame wherein it transmits in one portion of said frame and receives in. . .

CLAIMS:

CLMS (2)

2. The system of claim 1 wherein said base station operates full duplex channels and accommodates a plurality of simultaneous signals on each channel, each of said channels comprising separate receive and transmit. .

CLAIMS:

CLMS (3)

3. . . . voice digitization with a coding rate of 14.6 Kbps and is combined with 16-level DPSK modulation to provide four simultaneous full-duplex conversations on a single pair of 20 Khz channels.

CLAIMS:

CLMS (7)

7. The system of claim 1 wherein at the subscriber stations there is a simulated simultaneous two-way transmission of multiple signals on a single pair of channels.

CLAIMS:

CLMS (10)

10. The system of claim 8 wherein the modulation is applied on 25 KHz spaced full duplex channels in the 454 to 460 MHz band.